

NASA TECH BRIEF



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Controlled Current Inductors

The problem:

To design a field shunt, square loop, current dependent inductor with improved inductance-to-current characteristics. Current dependent inductors, commonly known as swinging chokes, have been designed for many years using the inherent soft knee of the magnetization curve. This allowed the designer to achieve a desired L vs I characteristic only within a limited range.

The solution:

A new design technique, in which the shape and the magnetic permeability of special core inserts may be varied to produce desired changes in the saturation characteristics of the inductor.

How it's done:

The core of this inductor is designed with two conventional "C" core pieces, with a nonmagnetic spacer and a magnetic spacer on one side, and a shaped magnetic spacer on the other. Choosing the shaped spacer to saturate at a total flux level lower than that which causes saturation in the two "C" core pieces allows a wide variety of relationships between inductance and current. In particular, the desired relationship may be derived by analytical, empirical, or experimental methods. Additional flexibility results from selecting

materials with different saturation levels or magnetization curves for the two magnetic spacers.

In one possible application of this invention, the variable magnetic spacer is coupled to another magnetic circuit, thus allowing an external signal to control the saturation of the inductor.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Headquarters
National Aeronautics
and Space Administration
Washington, D.C. 20546
Reference: TSP70-10494

Patent status:

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